MONTHLY WEATHER REVIEW,

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WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

Telegrams and Reports for the Benefit of Commerce and Agriculture.

INTRODUCTION.

This general review of the meteoric conditions which prevailed in the United States during November is based upon; *first:* the synchronous telegraphic reports received at this office from the stations of the Signal Service and those of the Canadian Meteorological Service, from which are obtained the extent and direction of the movement of barometric depressions, as shown on Chart No. I; *second:* the regular monthly reports from the stations of the Signal Service, Army Post and Naval Hospitals and Volunteer Observers, which serve to determine the several meteorological elements, as shown on Charts Nos. II and III., the hours of observation being 7 A. M., 2 and 9 P. M., local time.

A careful comparison of these data with corresponding reports of previous years show the following marked variations from the mean meteorological conditions of the month:

First—the low mean temperature in the districts north of the 40th parallel of latitude, where the weather, especially during the latter portion of the month, has been unusually severe, the range of temperature at several stations being more than eighty degrees Fahrenheit.

Second—the large number of areas of low barometer, and limited number of areas of high barometer.

Third—the large excess of rain on the Pacific coast, and the almost total absence of precipitation in the region of the Missouri and upper Mississippi valleys.

BAROMETRIC PRESSURE.

(1.) *In general.*—A comparison of Chart No. II with the corresponding Chart of the previous month shows the gradual movement of the areas of mean high and mean low barometer to the northeast, the former being now central on the Atlantic coast, corresponding in position to that of November, 1874, but is at least one-tenth (0.1) of an inch below the mean of that month. The rapid increase of pressure in the northern and western districts of the United States is probably due to the direct movement to the eastward of areas of high barometer, and the high latitude of the tracks of a large number of the areas of low barometer. The region of low barometer is identical with that of November, 1873, a month particularly distinguished for its low mean temperature. The distribution of pressure on the Pacific coast is the reverse of that shown on the Chart of the preceding month, the pressure having increased one-tenth (0.1) of an inch at San Diego, and from this point north to Portland decreases uniformly with an increase of latitude.

(2.) *Areas of High Barometer.*—These, though less numerous than in previous years, have in some cases been unusually marked, and accompanied by rapid and extreme changes in temperature, especially in the interior; they have approached the stations uniformly from the regions of the upper Missouri valley and Manitoba, and

with a single exception have moved toward the Atlantic with but slight changes in latitude. Nos. 1, 3 and 4 passed off the coast south of New York with no apparent change of direction, but Nos. 2, 5, 6, 7 and 8 passed more directly to the east, and after reaching the coast north of the 40° of latitude were apparently deflected to the northeast, following the general direction of the coast line until beyond the limits of the stations. The conditions attending the movements of these areas, while the centre remained within the region of observation, are generally as follows:

No. 1. The disappearance of the storm marked No. II off the south Atlantic coast was followed by increasing pressure throughout the United States east of the Mississippi river, which resulted in the gradual development of this area over the Middle and South Atlantic States during the 5th and 6th, and the succeeding reports of the 7th show the gradual movement of this area to the east, attended by clear or fair weather throughout the greater portion of the United States.

No. 2 moved slowly from north of the Lake region over New England during the 7th, 8th and 9th, following the direction of the coast line in advance of the storm marked as No. VI.

No. 3 was first observed on the morning of the 8th as central near the western boundary of Dakota, and moved to the eastward during the succeeding eight (8) hours, after which its course was directly southward to the west Gulf coast, where it was central on the 10th. A severe "Norther" occurred on the Texas coast during the 9th, the intensity of which was increased by the tropical storm then central in the Gulf. After reaching the Gulf coast its course changed from south to east, and followed the Gulf coast line to south Atlantic immediately in rear of depression No. VI.

No. 4 followed closely in the rear of the storm of the 15th–16th, causing a rapid increase of barometric gradients, clear and cold weather in the districts east of the Mississippi, the line of greatest pressure extending from the Platte valley to the coast of North Carolina during the 16th, 17th and 18th.

Nos. 5 and 6 were observed in the upper Missouri valley, the former preceding and the latter following the area of low barometer marked on the Chart as No. XII. The tracks of these areas lead more directly to the east than that of the mean direction of areas of high barometer. The precipitation which occurred through the Southern States and Ohio valley was favored by the distribution of pressure, which caused east and south winds around the former, then central on the Atlantic coast, and northerly winds on the east of the latter, then central in the Mississippi valley.

No. 7. The telegraphic reports of the 26th indicated the advance of this area from the region west of Hudson's Bay towards Lake Superior, and the succeeding reports show that it passed to the St. Lawrence valley, and thence to the northeastward during the 27th and 28th, attended by decidedly cold weather in the northeastern sections of the United States, and immediately preceding the last severe storm of the month.

No. 8 was central in the Missouri valley near Yankton at midnight of the 28th, and the following unusually high readings of the barometer were reported: Yankton, 31.08; Fort Sully, 31.00; Breckenridge, 30.91; Bismarck, 30.89; Pembina, 30.90; that at Yankton being the highest observed since the establishment of the Signal Service. The high and dangerous winds which preceded the advance of this area towards the Lake region show that the severity of storms depend more upon the relative difference of pressures than upon the low barometric readings of the central area. A severe "Norther" occurred on the Texas coast on the 29th, and decidedly cold weather prevailed throughout the United States, the temperature falling below freezing as far south as Shreveport and the interior of the Gulf States.

(2.) *Areas of Low Barometer.*—The unusually large number of barometric depres-

sions observed during the month have been traced on Chart No. I, and the mean hourly movement of each is given in the table. In comparing this Chart with those of preceding months it will be seen that the number of depressions occurring wholly within the United States has increased with the approach of winter. The direction of the movement and the mean latitude of the course of these depressions seem to determine the general character of the disturbance, and they may therefore be classified as follows: first, those originating in the Northwest, and passing to the east over the high latitudes, accompanied by southerly winds and slight disturbances in the several districts of the United States; second, those originating in lower latitudes, and passing to the east within the limits of the United States, attended in the northern districts by sudden and severe climatic changes, northeast winds, which back to the northwest as the depression passes to the east of the coast line. The following detailed account of each depression is given in the order of occurrence:

No I developed in the Ohio valley on the afternoon of the 1st, and passed rapidly to the south Atlantic, causing areas of light rain and snow in the Middle and New England States, while clear and warm weather continued in the southern sections of the country.

No. II. This extended depression was first observed on the morning of the 1st, central in the eastern portion of Wyoming Territory; during the succeeding eight hours its centre passed southeastward to Kansas, after which two distinct depressions were observed one moving directly to the east during the 2d, 3d and 4th, accompanied by rain in the northern sections, and high winds on the middle Atlantic coast; the other depression passed directly south during the 2d and 3d, the progressive movement being retarded until midnight of the 4th, when the course changed from south to east, the central area becoming defined as an elongated ellipse, the longer axis bearing towards the northeast as the depression passed rapidly from the Mississippi valley to the Atlantic. Heavy rains prevailed in the Southern States during the 3d and 4th, and marine reports show that a violent hurricane from the Northwest occurred on the 5th in latitude 32° longitude 74°.

No. III. A severe storm in the Gulf Stream, at no time within the limits of the United States, and only approximately traced, during the 2d and 3d, when the centre followed the general direction of the coast line and near Sydney, the barometer at that station reading 29.20 on the afternoon of the 2d.

No. IV. The midnight telegraphic report of the 5th indicated the approach of a tropical storm towards the Texas coast, accompanied by northeast gales and heavy rains in the west Gulf. This depression became more extended as it advanced to the east with increasing velocity, the region of precipitation including the entire Southern and Middle States.

No. V. Central in the upper Missouri valley on the night of the 6th, when the barometer was below the mean in the Northwest, upper Mississippi and lower Missouri valleys, passed to the north of the Lake accompanied by slight changes in temperature, but was followed by rapidly rising barometer and low temperature in the Northwest and Upper Lake region on the 8th and 9th.

No VI. The second tropical storm of the month was central as a slight depression near Indianola on the night of the 8th, and during the succeeding day moved slowly to the eastward, causing heavy rains on the Gulf coasts. The midnight reports of the 9th show a trough-like depression from the Gulf to Lake Superior, with two central areas, one near the coast, the other near Lake Erie. These depressions moved east and northeastward, uniting on the night of the 10th, when the storm-centre was near Boston. Severe gales occurred on the Atlantic coast as this depression passed to the northeastward, the central area becoming more contracted, and the gradient increasing rapidly in

its western quadrants. Cautionary Signals were displayed on the Atlantic coast from Hatteras to Eastport in advance of this storm.

Nos. VII and VIII originated in the extreme Northwest, and moved to the north of the Lake region during the 10th, 11th and 12th, without producing marked changes in the meteoric conditions.

No. IX. A depression in the Northwest on the night of the 11th which was apparently divided by the advance of an area of high barometer from the upper Missouri valley, forming No. VIII, already referred to, and No. IX, which moved slowly from the Southwest to the Lower Ohio valley, where it was central on the morning of the 13th, as an area of precipitation, and afterwards to the Atlantic coast, dividing on the morning of the 14th in the upper Ohio valley, and uniting after the minor depressions had passed to the eastern coast. Brisk and high northeast winds, accompanied by sleet and snow, prevailed in the districts north of the centre, and rain prevailed generally throughout the Southern States.

No. X. Central in the Northwest on the morning of the 14th, while the preceding depression was central on Lake Erie. It moved almost directly to the east over the northern portion of the Lake region and St. Lawrence valley to the Gulf of St. Lawrence, as one of the severe storms of the month, disastrous gales being reported from the Lakes on the 14th and 15th, and in the north Atlantic during the 15th and 16th. The barometer fell rapidly as the centre advanced, and the unusually low reading of 28.65 was observed at Sydney on the morning of the 17th. The winds became more dangerous after shifting to the north and west, and the barometric gradient was one inch to 400 miles when the centre was near Cape Breton.

No. XI was central in the extreme Northwest on the afternoon of the 17th, and the barometer was generally below the mean at the western stations. The course of this depression differs but slightly from the preceding one, while the reports show less marked changes. In the former the barometer fell rapidly with the easterly movement; in the latter the lowest barometric reading was observed in the northwest.

No. XII. The latitude of the origin and the track pursued by this depression, are approximately the same as in the two preceding depressions. It passed from the upper Mississippi valley to the Atlantic coast, during the 22d and 23d, causing heavy rains and high winds in advance of the center, and gales on the Atlantic coast during the 24th. The extreme low temperature which, followed this depression, may be more properly referred to the marked area of high barometer, which immediately followed.

No. XIII. The barometer was unusually low in the western territories, on the midnight of the 24th, when this depression developed, passing rapidly, first to the southeast, afterwards to the northeast as a severe storm, the area of rain including the entire country east of the Rocky Mountains. Signals were ordered, and generally verified, at the stations on the lakes and on the Atlantic coast, north of Cape Hatteras.

No. XIV moved rapidly from Nebraska to the Gulf of St. Lawrence during the 27th, 28th and 29th, and was the most violent storm of the month, the winds increasing in force until the center passed to the north Atlantic. Marine disasters occurred in the Gulf of St. Lawrence, causing great loss of life and property. The signals ordered at the several stations for this storm, were observed, and are reported, by those interested in navigation, as having been particularly advantageous to the shipping interests of the country.

TEMPERATURE OF THE AIR.

The isothermal lines on Chart No. II show the mean distribution of temperature for the month, and, also, that the decrease of temperature, with the increase of latitude, is uniform, and averages, in the districts east of the Rocky Mouhtains, 2° for each